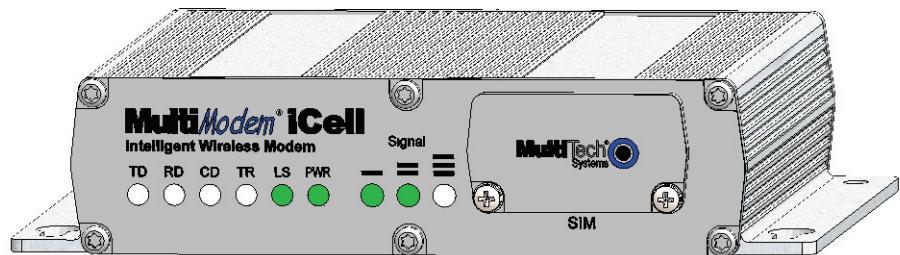

MultiModem® iCell

Intelligent Wireless Modem



User Guide



MultiModem® iCell User Guide
Intelligent Wireless Modem
MTCMR-H, MTCMR-E, MTCMR-G-F4
S000455A, Revision A

Copyright

This publication may not be reproduced, in whole or in part, without prior expressed written permission from Multi-Tech Systems, Inc. All rights reserved.

Copyright © 2009 by Multi-Tech Systems, Inc.

Multi-Tech Systems, Inc. makes no representation or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose.

Furthermore, Multi-Tech Systems, Inc. reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation of Multi-Tech Systems, Inc., to notify any person or organization of such revisions or changes. Check Multi-Tech's Web site for current versions of our product documentation.

Revision History

Revision Date Description

A 05/27/09 Initial release.

Trademarks and Logos

The Multi-Tech logo and *MultiModem* are registered trademarks of Multi-Tech Systems, Inc. Windows is a registered trademark of Microsoft in the U.S. and other countries. Other trademarks and trade names mentioned in this publication belong to their respective owners.

World Headquarters

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112
Phone: 763-785-3500 or 800-328-9717
Fax: 763-785-9874
Internet Address: <http://www.multitech.com>

Technical Support

Country

Europe, Middle East, Africa:
U.S., Canada, all others:

By Email

support@multitech.co.uk
support@multitech.com

By Phone

+(44) 118 959 7774
800-972-2439 or 763-717-5863

Warranty

Warranty information can be found at: <http://www.multitech.com>

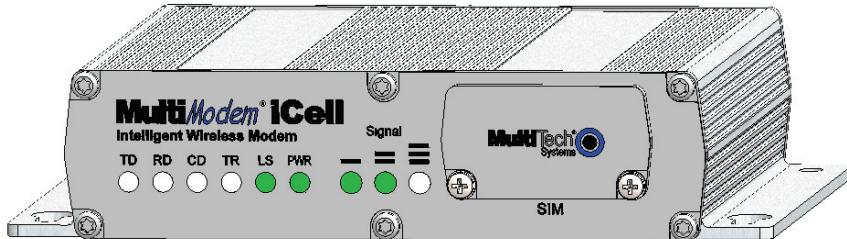
Contents

Chapter 1 – Product Description and Specifications	4
Product Description.....	4
Universal IP	4
MultiModem MTCMR-H (HSDPA)	5
MultiModem MTCMR-E (EDGE).....	5
MultiModem MTCMR-G-F4 (GPRS)	5
Safety.....	6
General Safety.....	6
RF Interference Issues.....	6
Vehicle Safety.....	6
Maintenance of the Wireless MultiModem	6
Handling Precautions.....	6
Front Panel	7
LEDs	7
Signal LEDs	7
Package Contents.....	8
Interfaces	8
Specifications	9
RF Specifications	10
Antenna Specifications	10
GSM/EGSM Antenna Requirements/Specifications	10
Antennas Available from Multi-Tech Systems, Inc.....	10
PTCRB Requirements Note	10
FCC Requirements Note.....	10
RS232 9-Pin Functions of the Female End Connector	10
GPIO (General Purpose Input/Output) 6-Pin Connector	11
GPIO DC Characteristics	11
AT Command Information	11
Chapter 2 – Activation and Installation	12
Activate Your Wireless Account	12
Insert the SIM Card into Holder, If required.....	12
Connect the Antenna, Serial Cable, GPIO Cable, and Power.....	13
Optional – Attach the Modem to a Flat Surface	14
Install the Modem Driver	15
Chapter 3 – Using Your Wireless Modem	20
Phone Numbers for the Wireless Modem	20
Examples of Useful AT Commands	20
Verifying Signal Strength	20
Checking Network Registration and Roaming Status	20
Checking the Modem's Identity	20
Connecting to the Internet.....	21
Connecting to a GPRS/EDGE/HSDPA Network for Internet Access	21
Create Your Dial-Up Connection in Windows XP/2003.....	22
Generic Dial-Up Method - Non-Windows	23
Appendix A – Regulatory Compliance	24
EMC, Safety, and R&TTE Directive Compliance	24
International Modem Restrictions	24
FCC Part 15 Class B Statement	24
Industry Canada	24
Appendix B – DC Power Cable.....	25
DC Power Cable Dimensions	25
Appendix C - Waste Electrical and Electronic Equipment (WEEE) Statement	26
Appendix D – ROHS HT/TS Substance Concentration	27

Chapter 1 – Product Description and Specifications

Product Description

The Multi-Tech MultiModem® iCell is a mid-range wireless modem. It is available in three models that require a SIM. All models contain an embedded TCP/IP protocol stack for internet connectivity, serial and USB connectors for modem configuration, USB connection for future use, and a General Purpose Input/Output (GPIO) connector for customer interface connection. All MultiModem iCells can be desktop or panel mounted.



The MultiModem iCell modems are available in four models:

Model	Description
MTCMR-H (HSDPA)	Standards based tri-band UMTS/HSDPA performance
MTCMR-E (EDGE)	Quad-band E-GPRS Class 10 performance
MTCMR-G-F4 (GPRS)	Quad-band GSM/GPRS Class 10 performance

All models contain an embedded TCP/IP protocol stack to bring internet connectivity to any device without making changes to its hardware design. Using the Internet protocols and the wireless connection to an IP network, the modems send and receive data over the Internet. The modems offer short message service (SMS) features such as text and PDU, Point-to-point (MT/MO) and cell broadcast.

The MultiModem iCell modems deliver some of the fastest cellular wireless data speeds using the various internet protocols. This is ideal for highly data-intensive applications such as remote video surveillance and other multimedia applications where you are sending digital images, web pages and photographs.

The MultiModem iCell modems are designed around a wide variety of interface options including serial RS-232, USB, and General Purpose Input/Output (GPIO). The serial RS-232 and USB connections provide seamless connectivity for configuration of your application. The GPIO interface provides five user configurable GPIO's as CMOS input or output ports to be connected to a customer's peripheral device. A customer application in which the GPIO interface could be used is one with a monitoring device connected to the GPIO interface in which the monitoring device triggers an event in the IP stack to establish a TCP or UDP socket connection or send an email stating that the monitoring device was triggered by high water.

Universal IP

All MultiModem iCell modems are equipped with an embedded TCP/IP protocol stack to automate the connection process and open a socket for bidirectional data transmission. Multi-Tech's Universal IP supports Telnet, SMTP/POP, FTP, TCP, UDP, PPP as well as other automatic call management options.

AT Commands: The embedded TCP/IP stack on the MultiModem iCell modems is configured using the Universal IP (UIP) AT Commands. These commands are documented in the Reference Guide document number S000457x.

MultiModem MTCMR-H (HSDPA)

The MultiModem MTCMR-H wireless modem delivers some of the fastest cellular data speeds by utilizing HSDPA technology. It allows users to connect to the Internet and send and receive data faster than possible with an ordinary GSM/GPRS network making it ideal for highly data-intensive applications. Based on industry-standard open interfaces, the MultiModem MTCMR-H wireless modem is equipped with quad-band, high-speed RS232 technology, which means it can be used worldwide on all existing GSM networks.

AT Commands: The MultiModem MTCMR-H wireless modem is configured using the HSDPA AT Commands. These commands are documented in the Reference Guide for the MultiModem Wireless HSDPA Modems, document number S000453x.

MultiModem MTCMR-E (EDGE)

The MultiModem EDGE wireless modem delivers some of the fastest cellular wireless data speeds utilizing EDGE technology. It allows users to connect to the internet, send and receive data up to three times faster than possible with an ordinary GSM/GPRS network making it ideal for highly data-intensive multimedia applications.

AT Commands: The MultiModem MTCMR-E wireless modem is configured using the EDGE AT Commands. These commands are documented in the Reference Guide for the MultiModem Wireless EDGE Modems, document number S000371x.

MultiModem MTCMR-G-F4 (GPRS)

The MultiModem GPRS wireless modem offers standards-based quad-band GSM/GPRS Class 10 performance. Ready to deploy, standalone data modem allows developers to add wireless communication to products with a minimum of deployment time and expense.

AT Commands: The MultiModem MTCMR-G wireless modem is configured using the GPRS AT Commands. These commands are documented in the Reference Guide for the MultiModem Wireless GPRS Modems, document number S000293x and also the Reference Guide for the Universal IP Commands, document number S000457x.

Safety

General Safety

The modem is designed for and intended to be used in fixed and mobile applications. “Fixed” means that the device is physically secured at one location and is not able to be easily moved to another location. “Mobile” means that the device is designed to be used in other than fixed locations.

Caution: Maintain a separation distance of at least 20 cm (8 inches) is normally maintained between the transmitter's antenna and the body of the user or nearby persons. The Modem is not designed for or intended to be used in portable applications within 20 cm. (8 inches) of the body of the user.

RF Interference Issues

It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of radio frequency, RF, interference. Please follow the safety advice given below carefully.

- Switch OFF your MultiModem when in an aircraft. The use of cellular telephones in an aircraft may endanger the operation of the aircraft, disrupt the cellular network and is illegal. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, or legal action or both.
- Switch OFF your MultiModem when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your MultiModem in hospitals and any other place where medical equipment may be in use.
- Respect restrictions on the use of radio equipment in fuel depots, chemical plants or where blasting operations are in progress.
- There may be a hazard associated with the operation of your MultiModem close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.
- Operation of your MultiModem close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

Vehicle Safety

- Do not use your MultiModem while driving.
- Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.
- If incorrectly installed in a vehicle, the operation of MultiModem telephone could interfere with the correct functioning of vehicle electronics. To avoid such problems, be sure that qualified personnel have performed the installation. Verification of the protection of vehicle electronics should be part of the installation.
- The use of an alert device to operate a vehicle's lights or horn on public roads is not permitted.

Maintenance of the Wireless MultiModem

Your wireless MultiModem is the product of advanced engineering, design, and craftsmanship and should be treated with care. The suggestions below will help you to enjoy this product for many years.

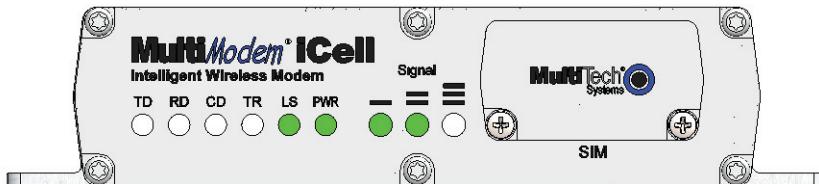
1. Do not expose the MultiModem to any extreme environment where the temperature or humidity is high.
2. Do not attempt to disassemble the MultiModem. There are no user serviceable parts inside.
3. Do not expose the MultiModem to water, rain, or spilled beverages. It is not waterproof.
4. Do not abuse your MultiModem by dropping, knocking, or violently shaking it. Rough handling can damage it.
5. Do not place the MultiModem alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the phone.
6. The use of accessories not authorized by Multi-Tech or not compliant with Multi-Tech's accessory specifications may invalidate the warranty of the MultiModem.
7. In the unlikely event of a fault in the MultiModem, contact Multi-Tech Technical Support.

Handling Precautions

All devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. Although input protection circuitry has been incorporated into the devices to minimize the effect of this static build up, proper precautions should be taken to avoid exposure to electrostatic discharge during handling and mounting.

Front Panel

The front panel is designed with two groups of LEDs that display modem activity and signal strength. The first group of LEDs display modem activity, such as transmit and receive data, carrier detection, line status, terminal ready indicating connection to the pc, and the power indicator. The three Signal LEDs display the signal strength level of the wireless connection. The SIM door on the right side of the modem provides access to the SIM card holder for those configurations.



LEDs

LED Indicators		
TD	Transmit Data. Lit when modem is transmitting data.	
RD	Receive Data. Lit when modem is receiving data.	
CD	Carrier Detect. Lit when data connection has been established.	
LS	Line Status Dependent on Model	
	MTCMR-G	MTCMR-H
	MTCMR-E	
Continuous “on” state indicates that the wireless modem is not registered on the network. Flashing state indicates registration on network. Off state. Modem is off (not ready) or in download mode.	Continuous “on” state indicates that the wireless modem is registered on the network. Flashing state Indicates attempted registration on network. Off state. Modem could not register	Permanently off. ME is in one of the following modes: Power Down mode, Airplane mode Non-Cyclic Sleep mode with no temporary wake-up event in progress. 600 ms on/600 ms off Limited Network Service: No SIM card inserted or no PIN entered, or network search in progress or ongoing user authentication, or network login in progress. 75 ms on/3 sec off Idle mode: The mobile is registered to the GSM network (monitoring control channels and user interactions). No call is in progress. 75 ms on/ 75 ms off/75 ms on/3 sec off One or more GPRS contexts activated. 500 ms on/ 25 ms off Packet switched data transfer in progress. Permanently on Depending on type of call: Voice call – Connected to remote party Data call – Connected to remote party or exchange of parameters while setting up or disconnecting a call.
TR	Terminal Ready. Commonly called “Data Terminal Ready.” This is a readiness signal from the PC.	
PWR	Power. Indicates presence of DC power when lit.	
Signal	Indicates the wireless signal strength. Refer to Signal Strength LEDs below.	

Signal LEDs

In order to verify signal strength, you must use a terminal application such as HyperTerminal. Refer to Examples of Useful AT Commands in Chapter 3 of this guide.

Package Contents

Unbundled Package Modem with No Accessories	Bundled Package Modem with Accessories
1 modem 1 Quick Start Guide 1 MultiModem CD Note: You must supply mounting screws, AC or DC power supply, and an antenna.	1 modem 1 antenna 1 RS232 cable 1 USB cable 1 GPIO cable 1 power supply 1 Quick Start Guide 1 MultiModem CD Note: You must supply mounting screws.

Note: Your wireless provider will supply the SIM card.

Interfaces

The MultiModem has several interfaces:

- LED function indicating operating status
- External antenna (via SMA connector)
- Serial and control link (via 9-pin DB9 female)
- USB 2.0 full speed, CDC-ACM Compliant (Future use)
- General purpose input/output (via 6 pin 2x3 style connector)
- Power supply (via 2.5mm miniature power jack)
- SIM card holder

Specifications

Features	MTCMR-H	MTCMR-E	MTCMR-G-F4
Performance	HSDPA/UMTS EDGE: Class 10 GPRS: Class 10	EDGE: E-GPRS Class 10, GPRS: Class 12	GPRS Class 10
Band, Frequency	Quad-band GSM/GPRS/EDGE/HSDPA 850/900/1800/1900 MHz UMTS FDD: Band I/ Band II/Band V	Quad-band GSM 850/900/1800/1900 MHz	Quad-band GSM 850/900/1800/1900 MHz
Packet Data	HSDPA: UE CAT [1-6], 11, 12 supported, compressed mode according to 3GPP TS5.212 EDGE: Class 10, full PBCC support, coding schemes CS-9, Mobile station Class B GPRS: Class 10, full PBCC support, coding schemes CS1-4, Mobile station Class B	EDGE: E-GPRS Up to 240K bps, coding scheme MCS-9, mobile station Class B, LLC layer, 4 time slots GPRS: Full PBCC support, coding scheme 1-4, mobile station Class B	Up to 85.6K bps, coding schemes CS1 to CS4
Circuit-Switched Data	GSM: Asynchronous, non-transparent up to 9600bps UMTS: Asynchronous, non-transparent up to 64K bps	Up to 14.4K bps, non-transparent	Up to 14.4K bps transparent and non-transparent
Short Message Services-SMS	Text & PDU, Point-to-Point (MO/MT), cell broadcast	Text & PDU, Point-to-Point (MO/MT), cell broadcast	Text & PDU, Point-to-Point, cell broadcast
Antenna Connector	RF Antenna: 50 ohm SMA (female connector)	RF Antenna: 50 ohm SMA (female connector)	RF Antenna: 50 ohm SMA (female connector)
SIM Connector	Standard 3V SIM receptacle	Standard 3V SIM receptacle	Standard 3V SIM receptacle
RS232 Connector	DB9	DB9	DB9
GPIO Connector	6 pin 2x3 style	6 pin 2x3 style	6 pin 2x3 style
Power Connector	2.5mm miniature(screw-on)	2.5mm miniature(screw-on)	2.5mm miniature(screw-on)
Voltage	9V to 32 VDC	9V to 32 VDC	9V to 32 VDC
Power*	Sleep .04A,.43W@9V,.021A,.42W@20V,.014A,.45W@32V Typical .325A,2.99W@9V,.152A,3.04W@20V;.01A,3.20W@32V Max .532A,4.89W@9V,.225A,4.50W @ 20V,.146A,4.67W@32V Peak NA	Sleep .037A,3.44W@9V,.018A,.358W@ 20V,.012A,.384W@32V Typical .118A,1.095W@9V,.092A,1.831W@20V;.060A,1.914W@32V Max .316A,2.910W@9V,.149A,2.965W @ 20V,.096A,3.062W@32V Peak .160A@9V, 1.0A@20V,0.70A@32V	Sleep .040A,.370W@9V,.020A,.40W@ 20V,.013A,.416W@32V Typical .105A,957W@9V,.050A,955W@20V;.038A,1.216W@32V Max .105A,957W@9V,.095A,1.881W @ 20V,.061A,1.946W@32V Peak .190A@9V,.750A@20V,.550A@32V
Physical Description	4.2" Wx1.1"Tx3.4"D 2lbs 12.5 cmW x2.7cmHx 8.6cmD 0.9Kg	4.2" Wx1.1"Tx3.4"D 2 lbs 12.5cmW x2.7cmH x 8.6cmD 0.9Kg	4.2" Wx1.1"Tx3.4"D 2 lbs 12.5cmW x2.7cmH x 8.6cmD 0.9Kg
Operating Temperature **	-30° to +60° C UL listed @ 40°	-30° to +50° C UL listed @ 40°	-30° to +70° C UL listed @ 40°
Storage Temp	-40° to +85° C	-40° to +85° C	-40° to +85° C
Humidity	Relative humidity 20% to 90% noncondensing	Relative humidity 20% to 90% noncondensing	Relative humidity 20% to 90% noncondensing
Certifications	CE Mark, R&TTE EMC: FCC Part 15, 22, 24; IC: RSS 132,133,102 EU: EN55022, EN55024 EN301 489-1, EN301 489-7, EN301 511 Safety: USA: UL60950 Canada: cUL60950; Europe: EN60950, Australia/New Zealand: AS/NZS 60950 Network: PTCRB	CE Mark, R&TTE EMC: FCC Part 15, 22, 24; IC: RSS 132,133 EU: EN55022, EN55024 EN301 489-1, EN301 489-7, EN301 511 Safety: USA: UL60950 Canada: cUL60950; Europe: EN 60950, Australia/New Zealand: AS/NZS 60950 Network: PTCRB	CE Mark, R&TTE EMC: FCC Part 15, 22, 24; IC: RSS 132,133 EU: EN55022, EN55024 EN301 489-1, EN301 489-7. EN301 511 Safety: USA: UL60950 Canada: cUL 60950; Europe: EN 60950, Australia/New Zealand: AS/NZS 60950 Network: PTCRB

* Multi-Tech Systems, Inc recommends that the customer incorporate a 10% buffer into their power source when determining product load.

** UL Listed @ 40°C. Limited by power supply. UL Certification does not apply or extend to an ambient above 40°C and has not been evaluated by UL for ambient greater than 40°C

"UL has evaluated this device for use in ordinary locations only. Installation in a vehicle or other outdoor locations has not been evaluated by UL. UL Certification does not apply or extend to use in vehicles or outdoor applications or in ambient above 40° C."

RF Specifications

	GSM 850	EGSM 900	GSM 1800	GSM 1900
Frequency RX	869 to 894 MHz	925 to 960 MHz	1805 to 1800 MHz	1930 to 1990 MHz
Frequency TX	824 to 849 MHz	880 to 915 MHz	1710 to 1785 MHz	1850 to 1910 MHz
RF Power Stand	2W at 12.5% duty cycle	2W at 12.5% duty cycle	1W at 12.5% duty cycle	1W at 12.5% duty cycle

Antenna Specifications

GSM/EGSM Antenna Requirements/Specifications

Frequency Range:	824 – 960 MHz / 1710 – 1990 MHz
Impedance:	50 Ohms
VSWR:	<2.0:1
Typical Radiated Gain:	3 dBi on azimuth plane
Radiation:	Omni
Polarization:	Vertical
Wave:	Half Wave Dipole

Antennas Available from Multi-Tech Systems, Inc.

Description	Part Number
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	ANF1-1HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	ANF21HRA
Hinged Right Angle 850/900/1800/1900 MHz Cellular Modem Antenna	ANQB-1HRA

PTCRB Requirements Note

There cannot be any alteration to the authorized antenna system. The antenna system must be the same type with similar in-band and out-of-band radiation patterns and maintain the same specifications.

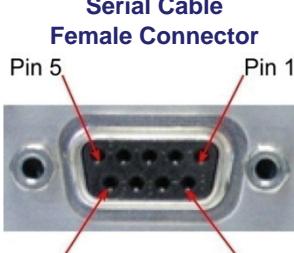
FCC Requirements Note

The antenna gain, including cable loss, must not exceed 3.0 dBi at 1900 MHz / 1.6 dBi at 850 MHz for mobile operating configurations and 7.0 dBi at 1900 MHz / 2.3 dBi at 850 MHz for fixed mounted operations, as defined in 2.1091 and 1.1307 of the rules for satisfying RF exposure compliance.

RS232 9-Pin Functions of the Female End Connector

The following table explains the pin functions.

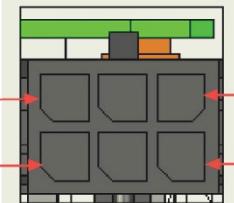
External Power		Serial Cable Female Connector
Signal	IN/OUT	
Pin 1 CD	O	
Pin 2 RX	O	
Pin 3 TX	I	
Pin 4 DTR	I	
Pin 5 GND	--	
Pin 6 DSR	O	
Pin 7 RTS	I	
Pin 8 CTS	O	
Pin 9 RI	O	



GPIO (General Purpose Input/Output) 6-Pin Connector

The GPIO pins are configured using Universal IP (UIP) AT Commands. Refer to the Universal IP (UIP) AT Command Reference Guide on your MultiModem CD. The following table explains the GPIO functions:

Pin Number	Description	GPIO 6-Pin Connector
Pin 1	DIO 0	
Pin 2	DIO 1	
Pin 3	DIO 2 / ADC 0	
Pin 4	DIO 3 / ADC 1	
Pin 5	ADC 2	
Pin 6	Gnd	



The GPIO pins can be configured independent of each other.

- Pin 1 can be configured as either Digital Input (5V tolerant TTL/CMOS levels) or Digital Output (3.3V High)
- Pin 2 can be configured as either Digital Input (5V tolerant TTL/CMOS levels) or Digital Output (3.3V High)
- Pin 3 can be configured as either Digital Input (5V tolerant TTL/CMOS levels) or Digital Output (3.3V High) or as an ADC input (0 to 3.3V rail)
- Pin 4 can be configured as either Digital Input (5V tolerant TTL/CMOS levels) or Digital Output (3.3V High) or as an ADC input (0 to 3.3V rail)
- Pin 5 is configured as an ADC input (0 to 3.3V rail)
- Pin 6 is GND and must be connected to the ground of the attached device

GPIO DC Characteristics

Pins 1-5

Parameter	Min	Max	Units
Input Low-level Voltage	-0.3	0.8	V
Input High-level Voltage	2.0	5.5	V
Output Low-level Voltage	0.0	0.4	V
Output High-level Voltage	2.9	3.3	V

Pins 1,2,3,4

Output Current

Parameter	Min	Max	Units
Output Current		2	mA

Pin 5 is an ADC input only

Pins 1-5 contain ESD protection

AT Command Information

AT commands for the MultiModem iCells are published in separate Reference Guides included on the MultiModem CD and posted on the Multi-Tech web site.

Chapter 2 – Activation and Installation

Activate Your Wireless Account

Please refer to the wireless account Activation Notices included with your unit and located on the MultiModem CD. Choose the one for your wireless network provider and follow the directions to activate your account.

Phone Numbers for the Wireless Modem

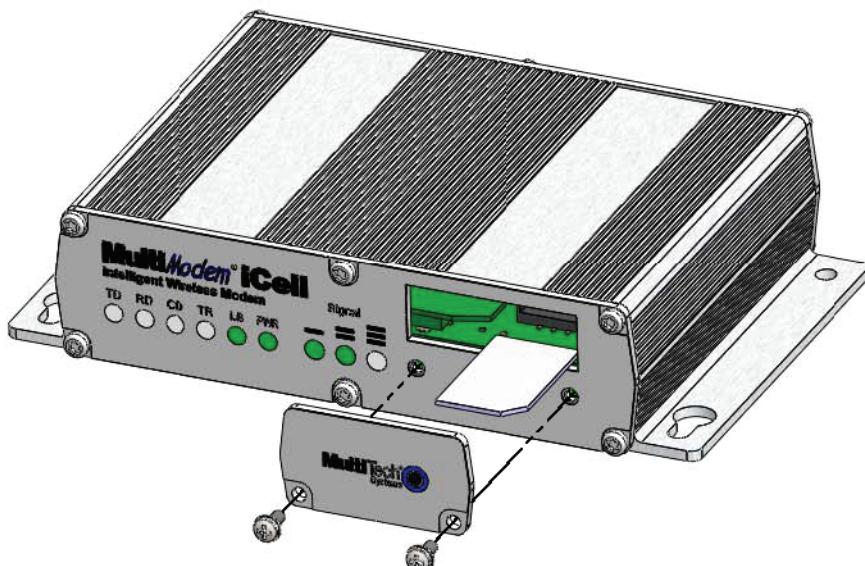
Every wireless modem will have its own unique phone number. The phone number may simply be given to you by your wireless service provider or it may be on the SIM card or both. Wireless provider implementations may vary.

Insert the SIM Card into Holder, If required

The MultiModem requires the power supply connection to begin operation. It also requires a SIM card (Subscriber Identity Module) to operate on a GSM network. To install the SIM, do the following:

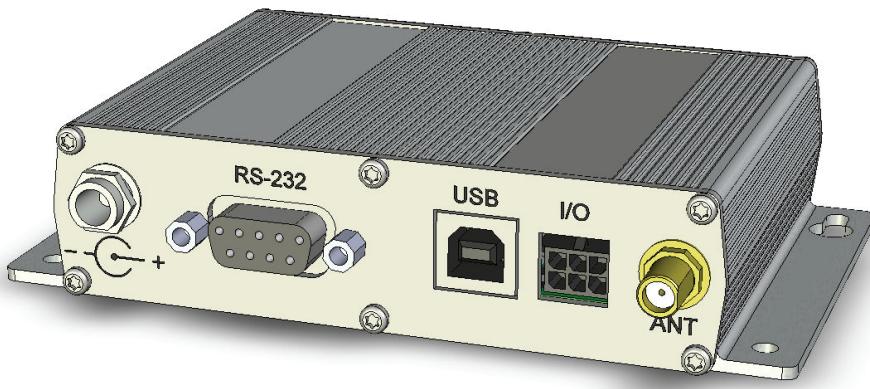
1. Using a small Phillips screwdriver, remove the two SIM door screws and remove the SIM door.

Note: When changing a SIM, ensure that power is removed from the unit.



2. Insert the SIM card into the card holder. The above graphic illustrates the correct SIM card orientation.
3. Verify that the SIM card fits into the holder properly and then replace the cover.

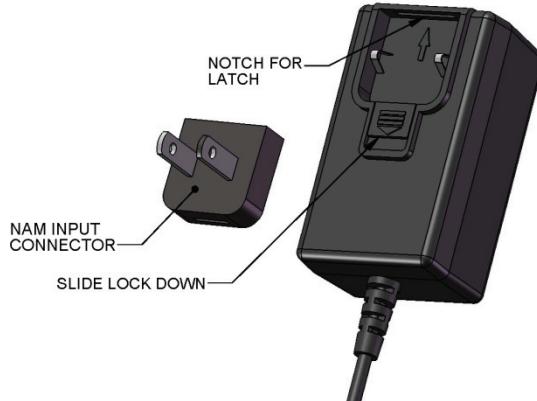
Connect the Antenna, Serial Cable, GPIO Cable, and Power



1. Connect a suitable antenna to the SMA connector (see antenna specifications in Chapter 1).
2. Connect the DB9 connector (9-pin) of the RS232 cable to the RS232 connector on the modem and connect the other end to serial port on your PC.

The USB connector is provided for future use.

3. Connect the GPIO cable to the I/O connector on the modem and the other end to the external device that the modem is monitoring.
4. Depending on the power source, connect either the power supply module with the appropriate blade or the optional DC power cable. If you are using the power supply module, remove the protective shipping cover. Attach the appropriate interchangeable blade piece to the power supply module.



Screw-on the power lead from the power supply module to the power connection on the modem. Now, plug the power supply into your power source.

For Optional Direct DC Power

- Screw-on the DC power cable to the power connector on the modem.
- Then attach the two wires at the other end of the DC power cable to a DC fuse/terminal block on a vehicle in which you are mounting the MultiModem.
- Connect red wire to the "+" (positive) terminal and black wire to the "-" (negative) terminal. Be sure the GND connection is correct.

Warning: Over-voltage protection is provided on the device. To ensure complete protection, you may want to add additional filtering to the DC input.

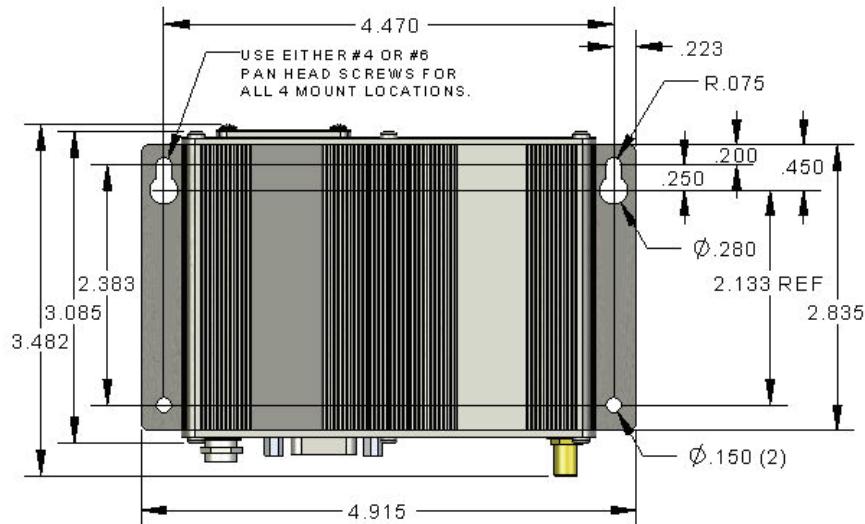
Note: For automotive application: according to the type of application, you can use permanent "+" or key-switched "+" source. Connect the power supply to its source (for example, in a mobile situation, to the vehicle's DC fuse/terminal block).

Optional – Attach the Modem to a Flat Surface

Before you mount your modem to a permanent surface, verify signal strength, refer to Using Your Wireless Modem, Verify Signal Strength in Chapter 3.

The modem can be panel mounted with screws spaced according to the measurement shown.

Note: Use either #4 or #6 pan head screws for all four mount locations.



Install the Modem Driver

Introduction

Compatibility: The MultiModem iCell is compatible with Windows Operating Systems: Vista, XP, 2003, Server 2008, and Linux.

Windows: The MultiModem iCell driver must be installed in your computer's program directory. The Windows driver is located on your MultiModem product CD. Refer to the example below for installing the Windows driver onto a PC.

Linux: Linux does not require a driver for serial modems.

Requirements

- One MTCMR-X modem
- A RS232 cable to connect the modem to the PC
- The MultiModem CD shipped with your Multi-Tech modem
- A PC running Windows

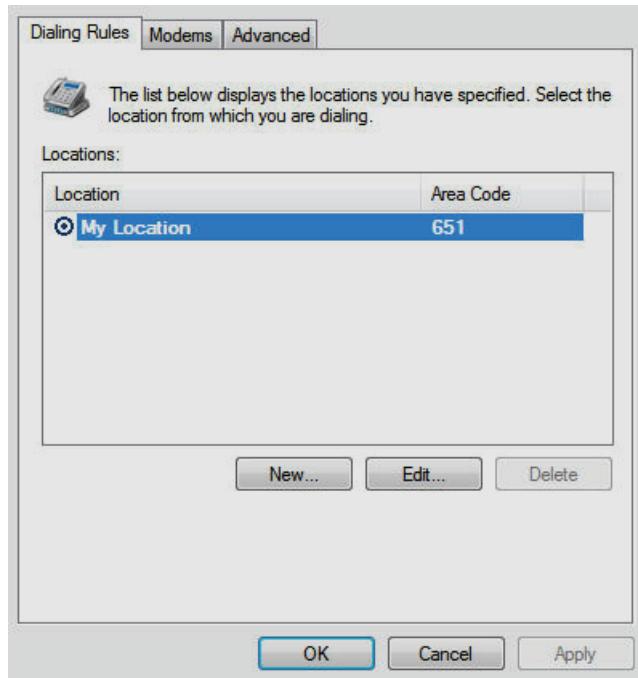
Note: This installation procedure is only used as a basic guide to help you install the MultiModem iCell driver. You may see differences based upon your version of Windows and your Windows settings.

Installing the MultiModem iCell Driver onto a PC Running Windows Vista/XP/2003/2008

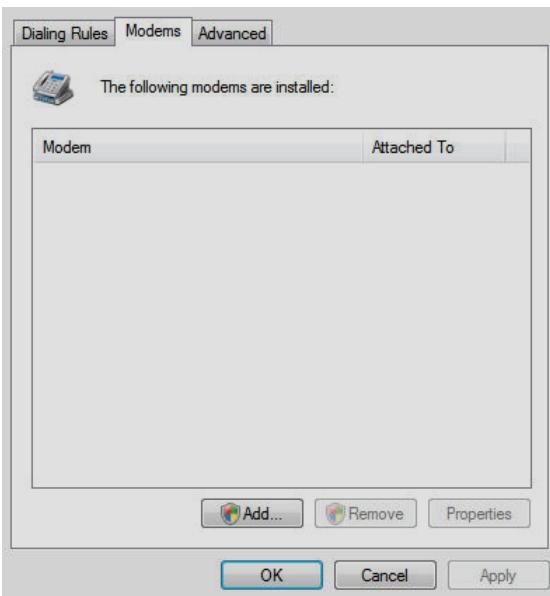
This installation assumes a Windows Vista, XP, 2003, or server 2008 operating system.

To load the MultiModem driver on your PC, select the Control Panel's *Phone and Modem Options* option. During this installation, you will be required to browse the MultiModem CD to load the modem's .inf file. This file is located at the root directory on the MultiModem CD.

1. Go to **Start**, and then click on **Control Panel**.
2. In the Control Panel, double-click on **Phone and Modem Options**.

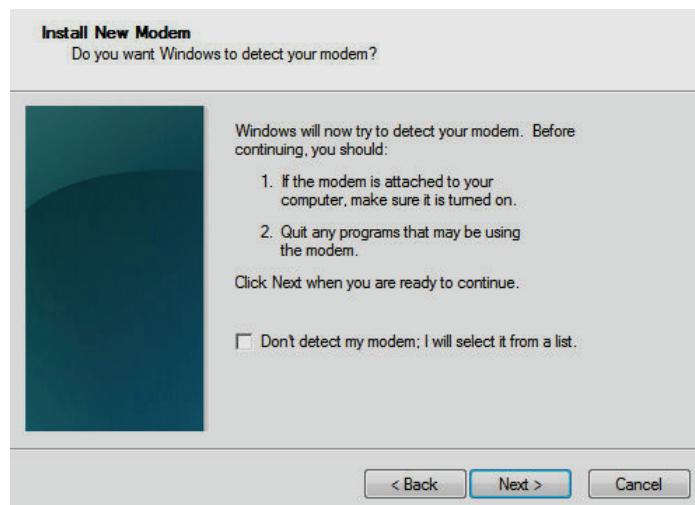


3. When the *Phone and Modem Options* screen appears, click on the tab labeled **Modems**.



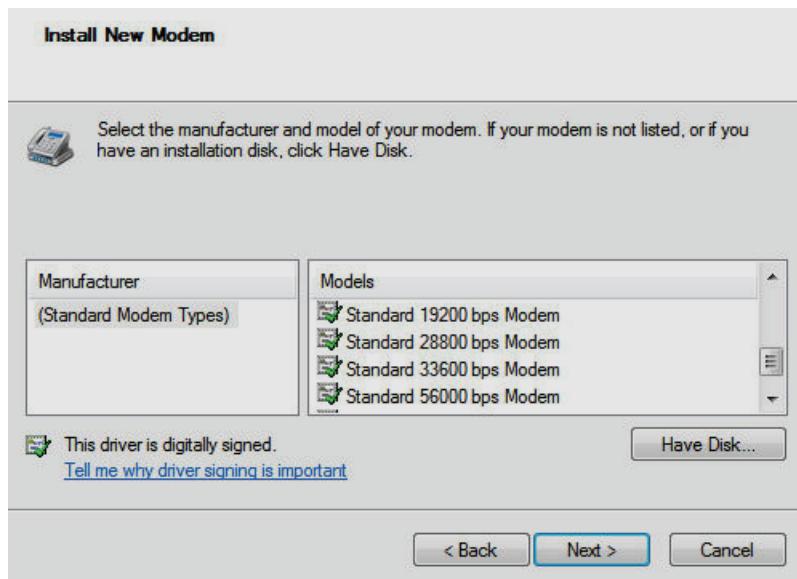
Click on **Add** to add a new modem.

4. On the *Install New Modem* screen



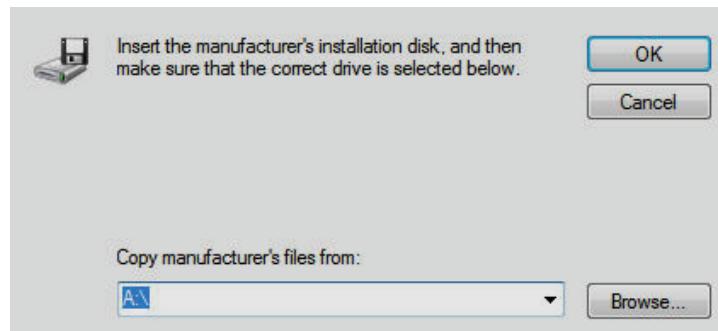
Click **Don't detect my modem, I will select it from a list**. Then click **Next >**.

5. On the next screen

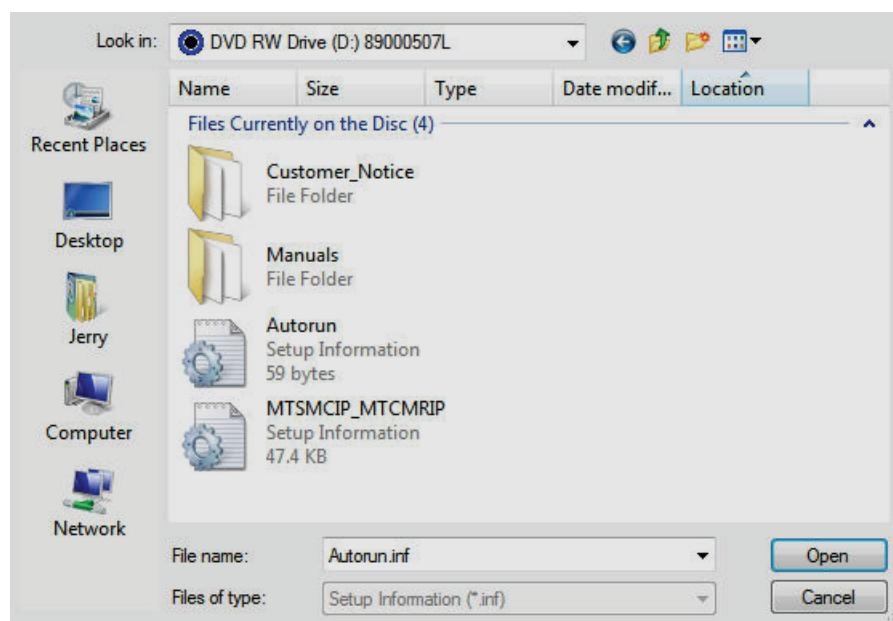


Click the **Have Disk** button to browse for the driver file on the MultiModem CD.

6. Make sure that the MultiModem CD is inserted into your CD-ROM,

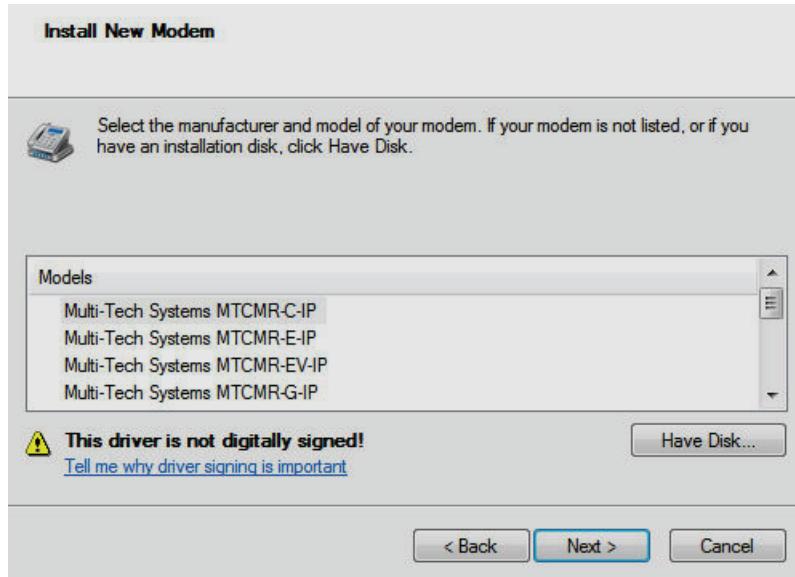


7. Browse to your MultiModem CD



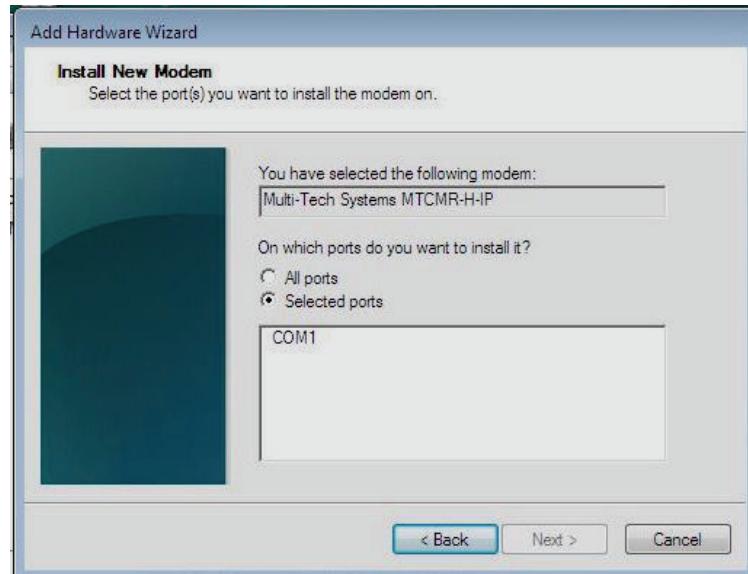
Select the **MTSMCIP_MTCMRIP.INF** file.

8. On this next screen, scroll down the list of modems and select the model that is applicable to your modem.



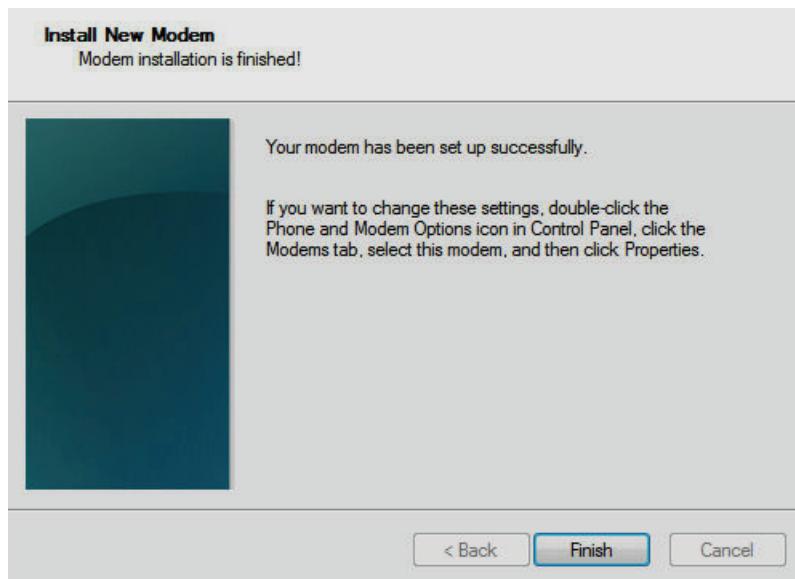
Once you have selected your model, click on **Next >**.

9. You will now have to choose which com port the MultiModem is connected to.



If you know exactly which port your modem is on, click on that port; otherwise, choose COM1 (most common). Click **Next >**.

10. To finish the install, click on **Finish**.



You have now successfully installed the MultiModem driver to your PC.

Verifying That Your Modem Has Been Installed Successfully

1. After you have successfully installed the MultiModem driver as stated above, you should be brought back to the *Phone and Modems Options* screen. Make sure that the modem is now listed under the columns **Modem** and **Attached To** (the correct com port).
2. Highlight the modem and then click on **Properties**.
3. A **Properties** screen will open for the Multi-Tech modem. Click on the tab labeled **Diagnostics**.
4. In the middle of the screen, click on the **Query Modem** button. Windows will now try to query the Multi-Tech modem. If this process passes, the second box on this screen will show the columns **Command** and **Response**.
Note: To make sure that the modem is correctly being queried, look at the LED lights of the modem after you click on *Query Modem*. The TR light should come on and the TD and RD lights should flicker.
5. If this process passes, then the modem should be properly installed and ready for use. Click **OK** to close the modem *Properties* window. Then click on **OK** to close the *Phone and Modem Options* window

Chapter 3 – Using Your Wireless Modem

Phone Numbers for the Wireless Modem

- Every wireless modem will have its own unique phone number.
- The phone number may simply be given to you by your wireless service provider or it may be on the SIM card or both. Wireless provider implementations may vary.

Examples of Useful AT Commands

A Note About HyperTerminal

In order to verify signal strength and roaming status, you must use a terminal application such as HyperTerminal. To open this program in Windows XP or Windows 2003, go to **Start > All Programs > Accessories > Communications > HyperTerminal**. Other Windows operating systems have similar paths to HyperTerminal. See your system's online Help if you cannot find it.

A Note About AT Commands

AT commands can be used to operate, configure, and query your modem. AT commands for the MultiModem iCells are published in separate Reference Guides included on the MultiModem CD and posted on the Multi-Tech web site. The following two commands let you query signal strength and roaming status.

Verifying Signal Strength

Using **HyperTerminal**, type **AT+CSQ**

The modem responds with the received signal strength (rss).

The modem responds with the received signal strength (rss) and the channel bit error rate (ber). RSSI ranges from 0 to 31.

Signal Strength Verification – RSSI		
AT+CSQ xx Values	Signal Strength	LED Bars
0 - 10	Weak or Insufficient	1 Bar LED is lit
11 - 20	Average	1 Bar and 2 Bar LEDs are lit
21 - 31	Exceptional	1 Bar, 2 Bar, 3 Bar LEDs are lit
99	No signal	No light

BER ranges from 0 to 7 (Seven is the highest error rate).

Checking Network Registration and Roaming Status

In this procedure, you will verify that the MultiModem has been registered on the wireless network. Using **HyperTerminal**, type **AT+CREG?**

The modem will respond in one of the following ways:

Network Registration Verification	
Value	Network Registration Status
0,0	The modem is not registered on any network
0,1	The modem is registered on the home network
0,5	The modem is registered on a network and it is roaming

Note: If the modem indicates that it is not registered, verify the signal strength to determine if the problem is the strength of the received signal.

Checking the Modem's Identity

Use the **ATI** command (Note: This command is illustrated using the capital letter I after **AT**)

- Type **ATI0** (Note: The command ends in a zero)
The manufacturing data displays. For example: Wavecom Modem Multiband G850 1900
- Type **ATI3**
The software version displays. For example: 651_09gg...
- Type **ATI6**
Displays modem data features. For example: data rates, data modes, fax classes.

Connecting to the Internet

The Multi-Tech MultiModem iCell is designed for a GPRS wireless network. Internet access can be setup in Windows Dial-Up Networking (DUN) of the computer that the MultiModem Icell is serving. For a GPRS network, you have to create an Access Point Name in the Phone and Modem Options dialog in Windows Control Panel and then create your Windows Dial-Up Connection (DUN).

Connecting to a GPRS/EDGE/HSDPA Network for Internet Access

After you have inserted the SIM card and all other setup steps are complete, you can establish an Internet connection through a Windows dial-up session.

Requirements

- One MultiModem iCell modem
- The MultiModem iCell modem should have an active SIM card and must have either GPRS, EDGE, or HSDPA services
- The modem must be getting a proper signal and be showing a network registration through the wireless provider's network
- A PC running Windows XP or 2003 with the Multi-Tech drivers installed for your particular model

The following instructions are for Windows XP SP2 and Windows 2003. Every PC may have slight differences which may cause the instructions to be different. Use these instructions as a guide to help you understand what is required to set up an Internet connection through your wireless service provider for all operating systems.

Set the Access Point Name (APN) into the Modem's Properties on you PC

In order for your GPRS/EDGE modem to connect to your provider's network, you must tell the modem the APN to which it will connect. The APN is a server name that your account is setup on with your provider. Your APN will be given to you by your provider. Here are some well known APNs:

- AT&T; PROXY, or INTERNET, or PUBLIC
- T-Mobile: INTERNET2.VOICESTREAM.COM, or INTERNET3.VOICESTREAM.COM, or WAP.VOICESTREAM.COM
- Rogers AT&T of Canada: INTERNET.COM

Setting up an Access Point Name (APN)

1. Click on the **Start** button and then **Control Panel**.
2. In **Control Panel**, double-click on **Phone and Modem Options**.
3. In the **Phone and Modem Options** screen, click on the **Modems** tab. Highlight your MultiModem listed in the table and then click on **Properties**.
4. A **Properties** window for your modem will display. Click on the **Advanced** tab and you should see an **Extra Settings** box. In the Extra initialization commands text box, enter:
AT+CGDCONT=1,"IP","<APN>"
For <APN>, enter in the correct APN for your account.
For example: **AT+CGDCONT=1"IP","ISP.AT&T"**
5. Click **OK** to close the Properties window. Then click **OK** to close the Phone and Modems Options window.

Create Your Dial-Up Connection in Windows XP/2003

1. Click on **Start** and then click on **Control Panel**.
2. In the *Control Panel*, double-click on **Network Connections**.
3. On the *Network Connections* screen on the left-hand side under **Network Tasks**, click on **Create a new connection**.
4. The *New Connection Wizard* should appear. It will walk you through setting up your Internet connection. Click on **Next >** to begin.
5. On the *Network Connection Type* screen, select **Connect to the Internet**, and then click **Next >**.
6. On the *Getting Ready* screen, select **Set up my connection manually**, and then click **Next >**.
7. On the *Internet Connection* screen, select **Connect using a dial-up modem**, and then click **Next >**.
Note: After clicking on Next, you may or may not be asked to select which modem to use. If you have more than one modem installed in your PC, you will be required to select the proper modem to use. If asked, please select the Multi-Tech wireless modem that has been installed.
8. On the *Connection Name* screen in the **ISP Name** box, type in a name for your new connection. You can give it any name that you would like. After you have typed in a name, click **Next >**.
9. On the *Phone Number to Dial* screen, type in the number that specifies to the modem to connect to your provider's Internet service.
 - Type in the number ***99***1#**.
 - Then click **Next>**.
10. On the *Connection Availability* screen, specify if this connection is for anyone's use or for your use only by checking the appropriate button. Choose your preference, and then click **Next>**.
11. On the *Internet Account Information* screen, type the user name and the password for your account. In many cases, a user name and a password are not required, but some wireless providers require it. Check with your provider to see if they are needed.
 - Check the following two options if you would like them activated:
 - Check the box if you want this account name and password to be used by everyone.
 - Check the box if you want this as your default Internet connection. Then click **Next >**.
12. On the *Completing the New Connection Wizard* screen, your last task is to place a check in the box if you would like to add a shortcut to your desktop. Then click **Finish**.
13. A *Connection* screen displays on your desktop. Click the **Properties** button on the bottom of this screen.
14. The *Properties* window will open for you to make your connection.
Important: Make sure that *Use dialing rules* is not selected, and then click **OK**.
15. Once back at your *Connection* screen, click the **Dial** button at the bottom of the screen to start the connection.
16. The connection will now tell the modem to connect to your provider's Internet service. Once connected, you should see the connection status icon in your system tray at the bottom right-hand corner of your screen.
You should now be able to open Internet Explorer or any other browser of your preference to surf the Internet.

Disconnecting the Connection:

1. To disconnect the connection, right click on the connection icon in your system tray at the bottom right-hand corner of your screen.
2. Scroll up and click on **Disconnect**.
You should now be disconnected from the Internet.

Generic Dial-Up Method - Non-Windows

1. To disable the IP stack, enter **AT+WOPEN=0**
2. To set up an Access Point Name (APN):
AT+CGDCONT=1, "IP",<APNSERVER>"
Where <APNSERVER> is the APN server supplied by your carrier
3. Dial onto the network using **AT*99***1#**

Serial Baud Rate

Your MultiModem iCell is defaulted to a serial baud rate of 115200 from the factory. To enjoy faster baud rates, you can manually set the modem to a higher speed (230400, 460800, or 921600) using the **AT+IPR=<baudspeed>**. However, you must make sure the host serial port is capable of the new speed. If the new speed is set and the host hardware is not capable of the higher speed, you will need to find a host that is capable or reset the nvram with the following:

Open a terminal application such as hyperterm with the following settings:
19200, 8, NONE, Hardware Flow Control

When the modem boots there is a 500ms window to do the following:

Issue:	M
Response:	MU
Issue:	D
Response:	M
Issue:	S
Response:	S<cr><lf>OK<cr><lf>

Recovery

To do this manually, power off the modem, depress the **Caps Lock** key and hold down the **M** key. Power on the modem, a **MU** should display. Press the **D** key and then the **S** key quickly.

Appendix A – Regulatory Compliance



EMC, Safety, and R&TTE Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

- Council Directive 2004/108/EC of 31 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility;
- and
- Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;
- and
- Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

FCC Part 15 Class B Statement

This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to 47 CFR Part 15 regulations. The stated limits in this regulation are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Plug the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the CFR 47 rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

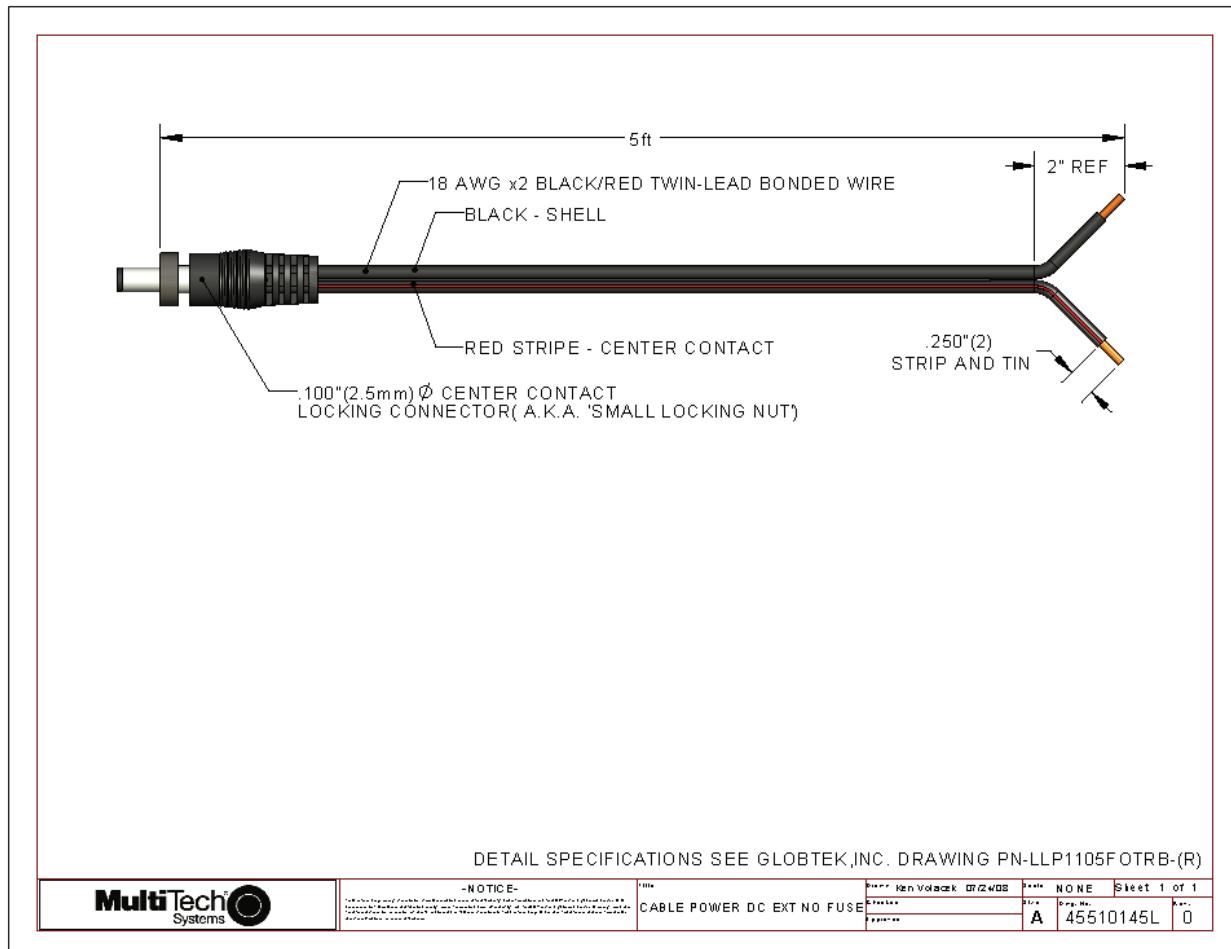
Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement canadien sur le matériel brouilleur.

Appendix B – DC Power Cable

DC Power Cable Dimensions



Appendix C - Waste Electrical and Electronic Equipment (WEEE) Statement

July, 2005

The WEEE directive places an obligation on EU-based manufacturers, distributors, retailers and importers to take-back electronics products at the end of their useful life. A sister Directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all Multi-Tech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.



Appendix D – ROHS HT/TS Substance Concentration

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准—中华人民共和国《电子信息产品污染控制管理办法》（第 39 号），也称作中国 RoHS，下表列出了 Multi-Tech Systems Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

成分名称	有害/有毒物质/元素					
	铅 (PB)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	○	○	○	○	○	○
电阻器	X	○	○	○	○	○
电容器	X	○	○	○	○	○
铁氧体磁环	○	○	○	○	○	○
继电器/光学部件	○	○	○	○	○	○
IC	○	○	○	○	○	○
二极管/晶体管	○	○	○	○	○	○
振荡器和晶振	X	○	○	○	○	○
调节器	○	○	○	○	○	○
电压传感器	○	○	○	○	○	○
变压器	○	○	○	○	○	○
扬声器	○	○	○	○	○	○
连接器	○	○	○	○	○	○
LED	○	○	○	○	○	○
螺丝、螺母以及其它五金件	X	○	○	○	○	○
交流-直流电源	○	○	○	○	○	○
软件/文档 CD	○	○	○	○	○	○
手册和纸页	○	○	○	○	○	○
底盘	○	○	○	○	○	○

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。

○ 表示不含该物质或者该物质的含量水平在上述限量要求之内。